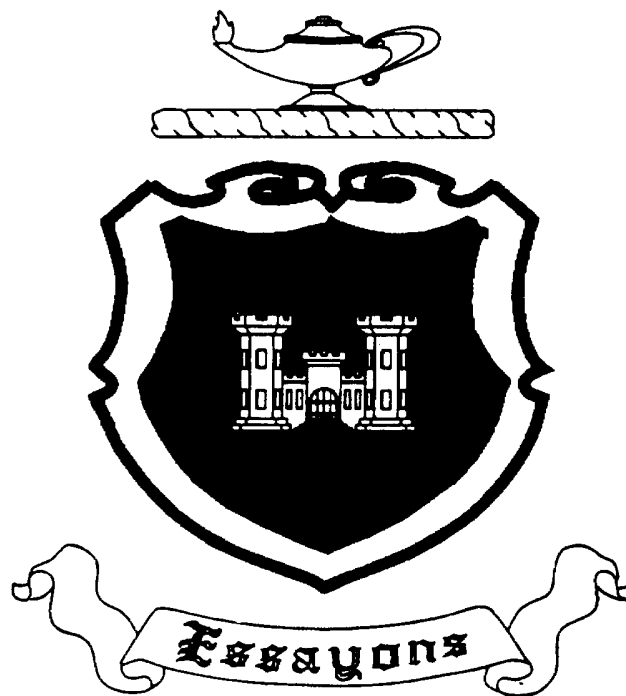

US ARMY ENGINEER CENTER AND SCHOOL

LAND-MINE WARFARE
PART II



"LET US TRY"

THE ARMY INSTITUTE FOR PROFESSIONAL DEVELOPMENT
ARMY CORRESPONDENCE COURSE PROGRAM

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**LAND-MINE WARFARE
PART II**

Subcourse EN5503

EDITION A

United States Army Engineer School
Fort Leonard Wood, Missouri 65473

3 Credit Hours

Edition Date: August 1998

SUBCOURSE OVERVIEW

This subcourse will enable you to perform premission requirements and install and arm hand-emplaced, wide-area munitions (Hornet). You will learn how to employ the Flipper, the Multiple-Delivery Mine System (Volcano), and the Modular Pack Mine System (MOPMS).

There are no prerequisites for this subcourse.

This subcourse reflects the doctrine which was current at the time it was prepared. In your own work situation, always refer to the latest official publications.

Unless otherwise stated, the masculine gender of singular pronouns is used to refer to both men and women.

TERMINAL LEARNING OBJECTIVE:

ACTION: You will learn how to employ the Hornet and scatterable mines.

CONDITION: You will be given a mission scenario, information on the employment of scatterable mines, paper, a number (No.) 2 pencil, and an Army Correspondence Course Program (ACCP) examination response sheet.

STANDARD: To demonstrate competency of this task, you must achieve a minimum of 70 percent of this subcourse.

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LESSON 1

EMPLOY THE HORNET

OVERVIEW

LESSON DESCRIPTION:

In this lesson, you will learn to employ the Hornet in four tactical scenarios. The scenarios are-conventional minefield reinforcement, scatterable minefield reinforcement, area-disruption obstacle, and gauntlet obstacle.

TERMINAL LEARNING OBJECTIVE:

- ACTION:** You will learn to employ the Hornet.
- CONDITION:** You will be given a mission scenario and the material contained in this lesson.
- STANDARD:** You must demonstrate your knowledge of how to perform premission requirements and install and arm the Hornet.
- REFERENCE:** The material contained in this lesson was derived from FM 20-32.

INTRODUCTION

In this lesson you will learn how to perform all premission requirements, install the correct obstacle pattern, and arm the Hornet.

1-1. General. The M93 Hornet is an antitank (AT) /antivehicular smart munition made of lightweight material (35 pounds) that one person can carry and employ (Figure 1-1, page 1-2). It is a one-time use, nonrecoverable munition that is capable of destroying vehicles by using sound and motion detection methods. It will automatically search, detect, recognize, and engage moving targets by using top attack at a standoff distance up to 100 meters from the munition. It is employed by combat engineers, ranges, and special-operations forces (SOF) that are equipped with an M71 remote control unit (RCU).

a. The RCU is a hand-held encoding unit that interfaces with the Hornet when the remote mode is selected at the time of employment After encoding, the RCU can be used to arm the Hornet, reset its self-destruct (SD) times, and destroy it.

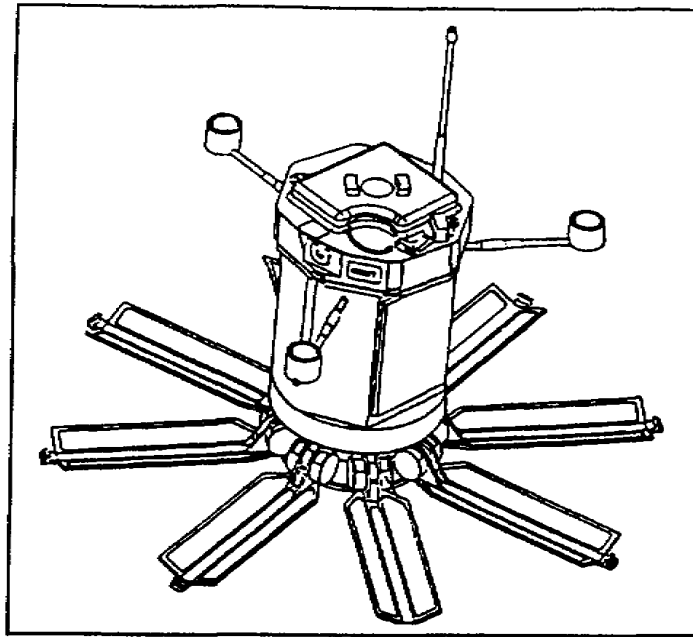


Figure 1-1. M93 Hornet

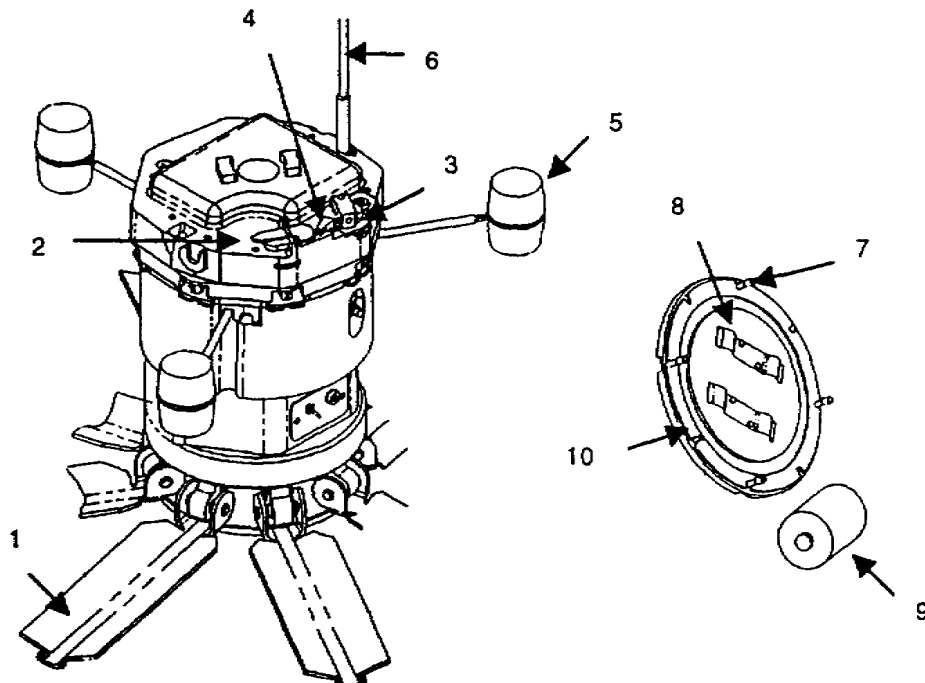
b. Current Hornet systems are not as effective in extreme cold weather. High winds and extreme cold reduce the Hornet's ability to detect targets at maximum range. Radio-frequency jamming devices (such as the hand-emplaced, expandable jammer [HEXJAM]) limit the Hornet's communication capabilities if they are placed in the munition field, but they will not affect the Hornet's ability to engage targets and will not damage the system. Radio-frequency jamming devices affect the remote arming of current Hornet systems using the MOPMS RCU, and they will affect future Hornet's two-way communications capability with the Centurion remote control device.

c. The future Hornet will introduce an entirely new concept to the combined arms team. It will report enemy vehicles and categorize them by type. It can be ordered or programmed to develop coordinated attacks with other minefields and direct- and indirect-fire weapons. The future Hornet will have an inactivation feature that allows freedom of maneuver through the minefield or obstacle while still providing near real-time intelligence and situational awareness.

1-2. Major Components, Controls, and Procedures. Refer to Table 1-1 for the major components of the Hornet.

1-3. Controls and Indicators. Refer to Table 1-2, page 1-5, for information about the controls and indicators of the Hornet.

Table 1-1. Hornet components



Component		Description												
1	Support legs	The support legs are used to stabilize the Hornet when it is deployed.												
2	Active battery cover	The active battery cover provides a seal to protect and secure the active battery pack when installed. The latch of the battery-pack cover is lifted up to remove the cover. The active battery pack is installed and the cover is then reinstalled and latched down. A line secures the battery-pack cover to the control panel of the munition to prevent loss.												
3	SD switch	<p>The SD switch is a six-position rotary switch that is used to select the SD time and unlock the arm control switch. The SD switch is also used to unlock the arming lever. This is done by rotating the switch to the setting "U." A red lock element is extended 1/8 inch from the side of the munition when the SD switch is in the unlock position.</p> <p>SD times are as follows:</p> <table><tr><td><u>Setting</u></td><td><u>Time</u></td></tr><tr><td>1</td><td>4 hours</td></tr><tr><td>2</td><td>48 hours</td></tr><tr><td>3</td><td>5 days</td></tr><tr><td>4</td><td>15 days</td></tr><tr><td>5</td><td>30 days</td></tr></table> <p>NOTE: The SD switch is preset to setting 1.</p>	<u>Setting</u>	<u>Time</u>	1	4 hours	2	48 hours	3	5 days	4	15 days	5	30 days
<u>Setting</u>	<u>Time</u>													
1	4 hours													
2	48 hours													
3	5 days													
4	15 days													
5	30 days													

Table 1-1. Hornet components (continued)

Component		Description
4	Arm control switch	The arm control switch consists of an arming lever interlocked with the SD switch and the safety-and-handling (S&H) band assembly to prevent accidental actuation. Until the S&H band assembly is removed and the SD switch is placed to the unlock position, the arming lever cannot be moved to the arm position. An internal lock secures the arming lever in the arm position.
5	Microphones	When the geophone-seismic sensor detects a potential target, usually at ranges up to 600 meters, it alerts the munition to start listening with the three microphones that extend from the munition body. They track the two loudest noise sources that are heard.
6	Antenna	The antenna provides a means for the Hornet to receive commands to remotely arm the munition using the M71 RCU.
7	Capture screws	The four flat-head screws secure the bottom plate to the munition body. They are removed along with the bottom plate to access the battery compartment.
8	Bottom plate	The bottom plate provides a seal to protect and secure the battery compartment and connect the batteries once they are installed.
9	D-cell batteries	The battery compartment houses four D-cell batteries. A drawing on the inside of each battery tube shows battery placement.
10	Dowel pin	The dowel pin is used to ensure that the bottom plate is in the correct placement to connect the batteries properly.

1-4. Employment Considerations. The Hornet's active battery pack is inserted during prearming and has an estimated life of 4 hours. The active battery pack powers the munition from the time it is inserted until the end of the safe-separation time, when the built-in reserve battery is activated. To prevent munitions from becoming dud, do not prearm them too early. Allow enough time for traveling to the obstacle site, emplacing mines, throwing arming switches, and permitting self-separation times to expire.

a. Once the Hornet is armed and the selftest is preformed, the munition will remain active until its SD time expires or until it is encountered. The SD time (4 hours, 48 hours, 5 days, 15 days, or 30 days) is determined by the mission and the commander's intent. The munition will self-detonate after the SD time has expired.

Table 1-2. Hornet controls and indicators

Control/Indicator		Description
1	Magnetic coupling device (MCD)	This device is used as part of the RCU interface. The RCU interface consists of the MCD and keyed tabs. In the remote arming mode, the RCU is placed on top of the MCD and minefield code data is transferred to the munition. Successful encoding causes the status light to flash.
2	Target switch	The target switch is a toggle switch used to select the type of target engagement. This gives the operator the choice between detecting and destroying only heavy armor vehicles or all vehicles.
3	Manual select switch	The manual select switch is a push-button switch, protected by a plastic cover that must be removed to access the switch. Successful activation of the switch will cause the status light to flash. This switch is used to allow the operator to employ the Hornet without the RCU.
4	Status light	The status light is a visual indicator for the operator during the munition setup. A green light-emitting diode (LED) indicates to the operator that a self-test was performed successfully or an operating mode selection was selected successfully.
5	SD switch	The SD switch is a six-position rotary switch that is used to select the SD time and unlock the arm control switch. It is used to unlock the arming lever by rotating the switch to the setting "U." A red lock element is extended 1/8 inch from the side of the munition when the SD switch is in the unlock position.

Table 1-2. Hornet controls and indicators (continued)

Control/Indicator		Description
6	Arming lever	The arm control switch consists of an arming lever interlocked with the SD switch and the S&H band assembly to prevent accidental actuation. Until the S&H band assembly is removed and the SD switch is placed in the unlock position, the arming lever cannot be moved to the arm position. An internal lock secures the arming lever in the arm position.
7	Active battery-pack cover	The active battery cover provides a seal to protect and secure the active battery pack when installed. The latch of the battery-pack cover is lifted up to remove the cover. The active battery pack is installed, and the cover is then reinstalled and latched down. A line secures the battery-pack cover to the control panel of the munition to prevent loss.

b. Hornet munitions have an employed life of 60 days in the prearmed mode (remote arming) and 30 days in the armed mode. If the temperature exceeds 100 degrees Fahrenheit, the employed life drops to 15 days in the prearmed mode and 30 days in the armed mode. Munitions placed at ground level should be no closer to obstructions than the distances shown in Table 1-3.

Table 1-3. Employment distances

Maximum Obstruction Height	Minimum Employment Distance From Obstruction
1 meter	3 meters
2.5 meters	5 meters
6.5 meters	15 meters
25 meters	25 meters

c. The Hornet--

- Cannot distinguish between friendly or threat tracked vehicles.
- Can only operate on slopes up to 15 degrees (27 percent slope).
- Cannot operate in snow depths greater than 8 inches.

1-5. Employment Roles. Combat engineers or maneuver forces under engineer supervision emplace Hornets in close operations. SOFs or rangers emplace Hornets in deep operations. Hornets will be used throughout the entire depth of the battle space to support Army operations.

a. Close operations. In close operations, the Hornet can be-

- Used to fix the enemy and weaken it along its avenue of approach.
- Emplaced as an offensive-support weapon system because of its quick emplacement time and wide attack area.

- Employed rapidly along exposed flanks during a maneuver as a situational obstacle to disrupt the enemy's counterattacks.
- Used as a stand-alone tactical obstacle or as a reinforcement to other conventional obstacles.
- Used to disrupt and delay the enemy, allowing long-range precision weapons to engage more effectively. This feature is particularly effective in non-line-of-sight engagements.

b. Deep operations. In deep operations, the Hornet can be-

- Emplaced along key routes in gauntlet obstacles to disrupt and delay threat second-echelon forces, resupply operations, and key lines of communication.
- Used at command and control (C²) and logistics sites to disrupt enemy operations.

c. Rear operations. In rear battle, the Hornet can be emplaced (unarmed) along key routes in preparation for possible retrograde operations.

d. Early-entry operations. In early-entry operations, the Hornet can be-

- Used as an additional antiarmor weapon to supplement light forces.
- Used along high speed avenues of approach in gauntlet obstacles to buy time and space.

1-6. Tactical Emplacement. There are four basic emplacement scenarios for the Hornet. They are conventional minefield reinforcement, scatterable minefield reinforcement, area-disruption obstacle, and gauntlet obstacle.

a. Conventional minefield reinforcement. The Hornet can be used to reinforce a conventional turn, block, or fix minefield (Figure 1-2, page 1-8). Platoon engineers emplace the Hornet minefield as follows:

(1) Mine dumps.

(a) Hornet pallets are picked up at a brigade ammunition transfer point and transported on a heavy expanded mobility tactical truck (HEMTT) to the mine dump.

(b) Engineer units remove the Hornets from their packaging. If time allows, the munitions are prearmed and then loaded in two emplacement vehicles (normally combat engineer squad vehicles) using approved blocking and bracing procedures. While

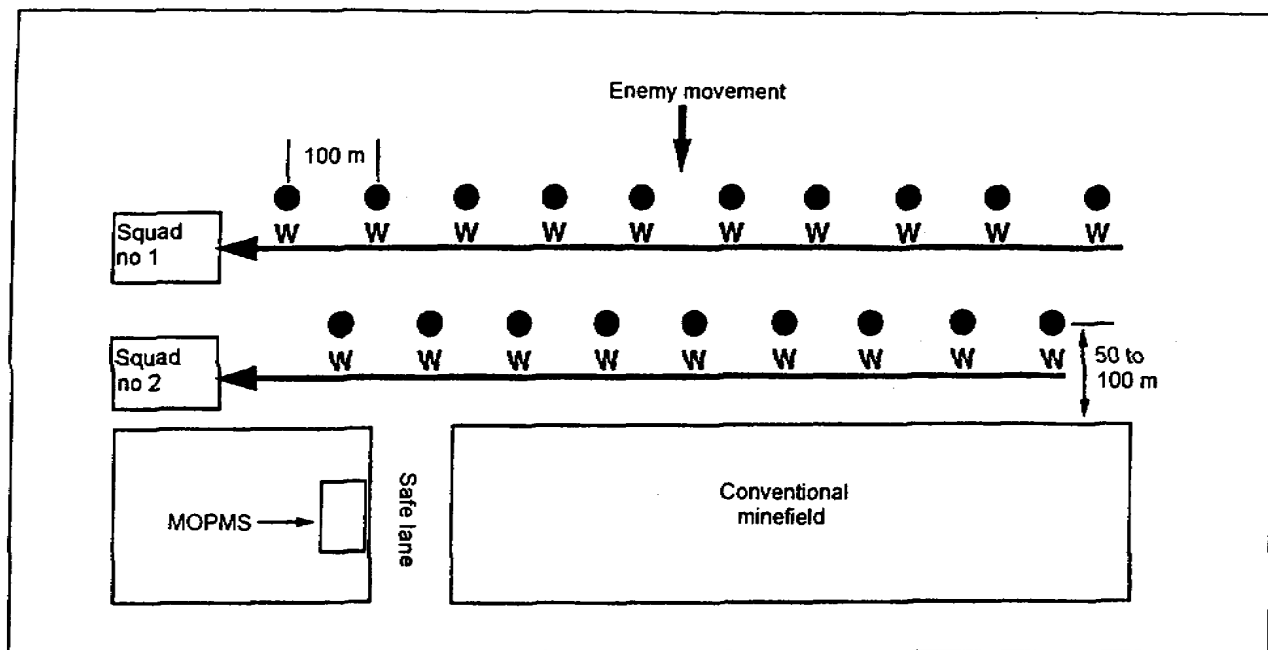


Figure 1-2. Hornet reinforcing a conventional minefield

this is being done, the third squad and the platoon sergeant will site and mark the minefield, to include conventional and Hornet rows.

(c) Two emplacement vehicles travel 20 to 40 kilometers per hour (on a road) or 15 kilometers per hour or less (cross-country) to the minefield site.

(2) Minefield emplacement site.

(a) Engineers emplace the conventional minefield first, and then they traverse the safe lane that is perpendicular to the minefield. The Hornets are employed in two staggered rows, spaced 100 meters apart, 50 to 100 meters from the front edge (on the enemy side) of the conventional minefield. The emplacing vehicles work towards the safe lane.

(b) Two squads employ Hornets in two rows of ten each. One or more soldiers provide security. Under the supervision of a noncommissioned officer (NCO), four soldiers in each squad vehicle start prearming the Hornets, if necessary. They-

- Rotate the handle
- Remove the cover.
- Insert the active battery pack and verify functionality via a solid status light.
- Reinstall the active battery-pack cover.

- Select the SD time.
- Encode the Hornet with the M71 RCU and verify proper coding via a flashing status light.
- Reinstall the cover.

(c) Each emplacement vehicle moves to the first Hornet emplacement site in each row. The emplacing soldier and the arming soldier dismount. The emplacing soldier is handed a Hornet from the vehicle. He emplaces the Hornet at the designated spot, grabs the marking stake, and returns to the vehicle.

(d) The arming soldier rotates the handle on the Hornet, removes the cover and the S&H band, rotates the SD switch to *U* (the arm switch unlock position), and pushes the arm switch to *ARM*. He then returns to the vehicle, taking the cover and the S&H band with him. The vehicle travels to the next Hornet emplacement site.

(e) After all the Hornets have been emplaced and armed, the emplacing vehicles exit through the safe lane and usually secure it with a MOPMS. The emplacement vehicles must be at least 475 meters (safe standoff distance) from the nearest Hornet within 30 minutes.

NOTE: Hornets can be remotely armed 36 minutes after the arming switch is thrown on the last Hornet emplaced. If manual arming is used, Hornets automatically arm at the end of their safe-separation time (5 to 6 minutes after the arming switch is thrown).

Vehicles must wait at least 36 minutes after the last Hornet has its arming switch thrown before the Hornets are remotely armed with the M71 RCU. Hornets are now capable of covering the minefield by fire and engaging threat tracked vehicles (such as breachers or tanks).

b. Scatterable minefield reinforcement. The Hornet can be used to reinforce a turn, block, or fix scatterable minefield (Figure 1-3, page 1-10). Platoon engineers emplace the Hornet minefield as follows:

(1) Mine dump. Refer to the procedures outlined in paragraph 1-6a(1), page 1-7.

(2) Minefield emplacement site. Refer to the procedures outlined in paragraph 1-6a(2), page 1-8. The Volcano dispensing vehicle can begin emplacing mines once all the Hornets are emplaced. To ensure that the Volcano dispensing vehicle has sufficient time to reach the safe standoff distance (475 meters), Volcano dispensing should start no later than 30 minutes (minus the Volcano dispensing time [DT]) after the first Hornet's arming switch is thrown. Refer to paragraph 1-6a(2)(e).

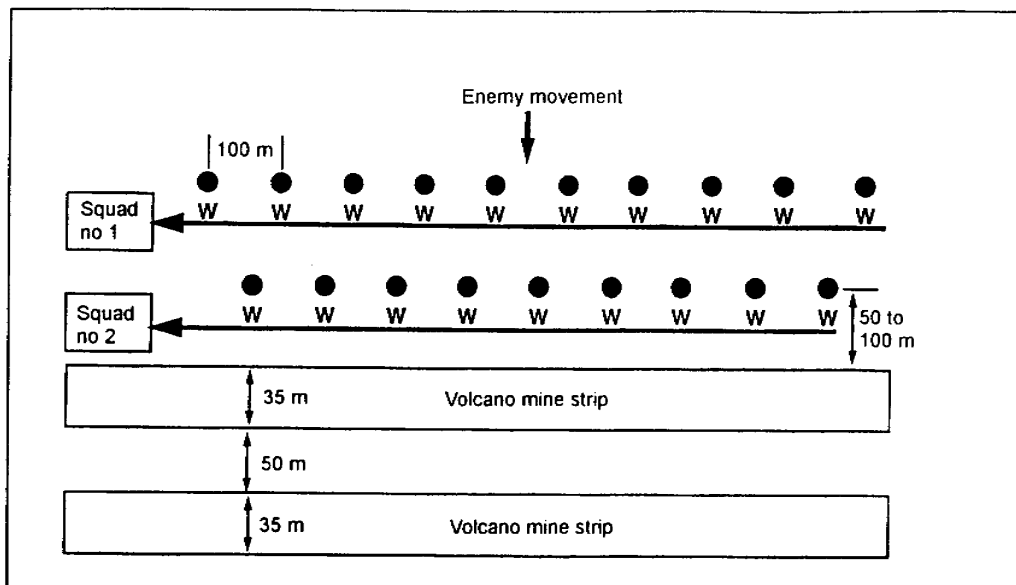


Figure 1-3. Hornet reinforcing a Volcano minefield

c. Area-disruption obstacles. When the X-pattern is employed, the Hornet is very effective as a disrupting obstacle (see Figure 1-4). An area-disruption obstacle is employed to disrupt the enemy's approach before the start of the direct-fire battle. It causes disruption and attrition of the advancing threat force and encourages follow-on forces to seek an alternate route. Therefore, multiple area-disruption obstacles will typically be employed to adequately cover the cross-country avenue of approach. This requires coordinated action among multiple squads. Ensure that no soldiers are within 475 meters of armed Hornets. An engineer platoon emplaces the Hornet area-disruption obstacle as follows:

(1) Mine dump.

(a) Hornet pallets are picked up at a brigade ammunition transfer point and transported on a HEMTT to the mine dump.

(b) The engineer unit removes the Hornets from their packaging. The munitions are loaded into the emplacement vehicles and/or trailers (normally combat engineer squad vehicles and/or trailers) using approved blocking and bracing procedures. Before this is done or while it is being done, one squad and the platoon sergeant will site and mark the area-disruption obstacle or at least do a map reconnaissance to determine the four corners of the obstacle, munition settings, and if time permits, the location of individual Hornets in the obstacle.

(c) The emplacement vehicles travel 20 to 40 kilometers per hour (on a road) or 15 kilometers per hour or less (cross-country) to the site of the Hornet area-disruption obstacle. The area-disruption obstacle will be located up to a maximum of 5 kilometers from the mine dump. It will be employed beyond the range of friendly direct fires, with the intention of disrupting the enemy's approach while it is traveling in prebattle formation. Two squad vehicles will go to the emplacement sites for the two clusters closest to the enemy. The third squad vehicle will provide overwatch or security on the friendly side of the obstacle.

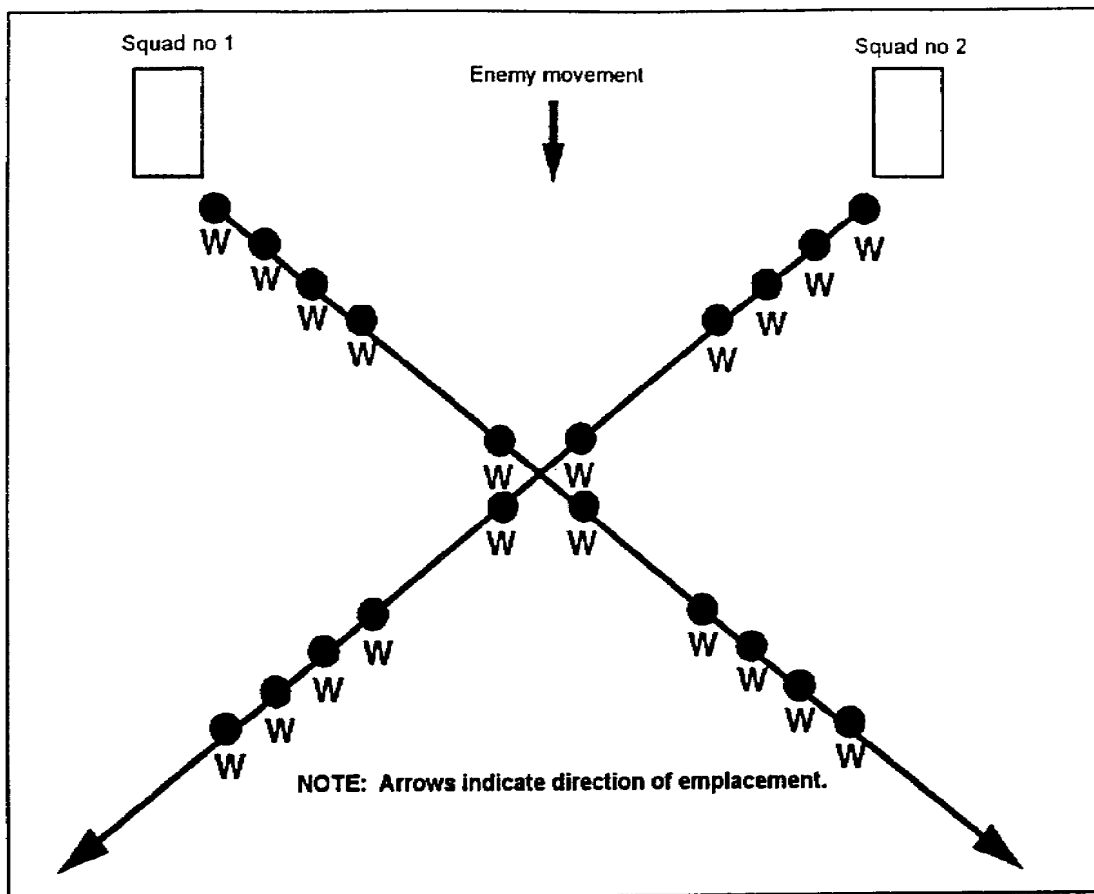


Figure 1-4. Hornet area-disruption obstacle

(2) Area-disruption obstacle emplacement site.

(a) An engineer platoon emplaces a Hornet area-disruption obstacle. The obstacle typically consists of 20 Hornets (five clusters of four Hornets each) employed in an X-pattern over a 1-by 1-kilometer area. Individual Hornets are emplaced about 100 meters apart. Emplacing this obstacle must be done as a dispense-and-roll operation to ensure that the emplacing vehicles can reach the safe standoff distance (475 meters) from any armed Hornets.

(b) Hornets are prearmed as outlined in paragraph 1-6a(2)(b), page 1-8.

(c) Upon arrival at the emplacement site, two squads lay the Hornets in unison, starting with the two emplacement sites closest to the enemy. Each squad drives in a straight line, crossing paths at the middle of the X, and emplaces 10 Hornets. A soldier in the back of each emplacing vehicle will be handed a prearmed Hornet. He throws the arming switch and sets the Hornet down or drops it off (base down) the back of the vehicle. After all the Hornet dusters are emplaced, the squad vehicles will quickly travel to the 475-meter safe standoff distance (no further than 2 kilometers) to prepare for remote arming. Hornets can be remotely armed 36 minutes after the arming switch is thrown on the last Hornet emplaced. If manual arming is used, Hornets automatically arm at the end of their safe-separation time (5 to 6 minutes after the arming switch is thrown).

d. Gauntlet obstacles. The high-explosive Hornet can be used as a gauntlet obstacle (see Figure 1-5). This pattern is effective in constricted terrain along the enemy's avenue of approach. An engineer platoon emplaces the Hornet gauntlet obstacle as follows:

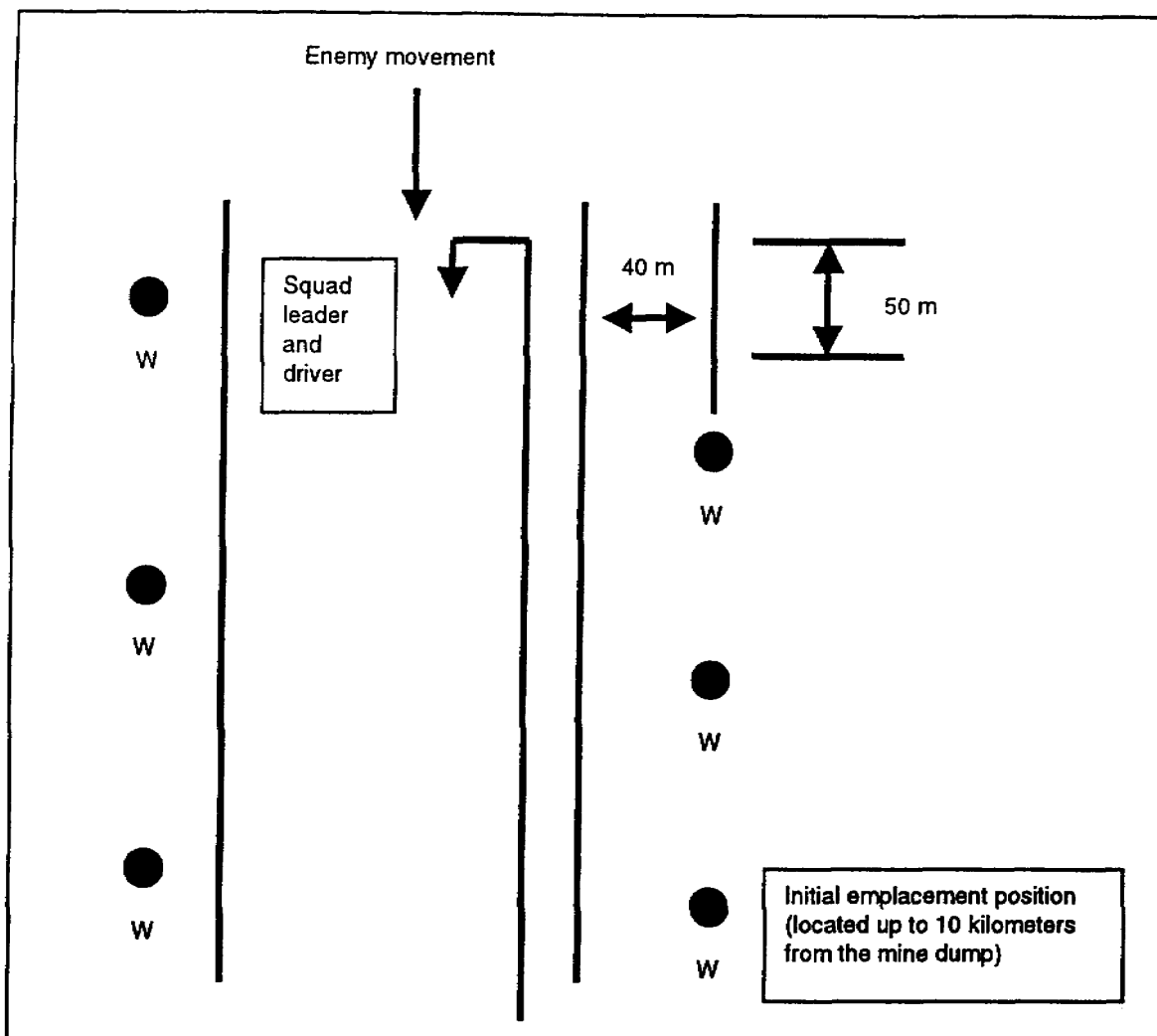


Figure 1-5. Hornet gauntlet obstacle (one cluster)

(1) Mine dump.

(a) Hornet pallets are picked up at a brigade ammunition transfer point and transported on a HEMTT to the mine dump.

(b) Refer to paragraph 1-6c(1)(b), page 1-10, for packaging removal and loading. Before this is done or while it is being done, one squad and the platoon sergeant will site and mark the gauntlet obstacle or at least do a map reconnaissance to determine duster locations, munition settings for each duster, and if time permits, the number and location of individual Hornets in each cluster.

(c) The emplacement vehicles travel 20 to 40 kilometers per-hour (on a road) or 15 kilometers per hour or less (cross-country) to the site of the first cluster in the Hornet gauntlet obstacle (the one closest to the enemy). The first cluster in the Hornet gauntlet obstacle may be located several kilometers away (up to 10 kilometers or more) from the mine dump.

(2) Gauntlet obstacle emplacement site.

(a) Hornet gauntlet obstacles are emplaced by an engineer platoon along likely threat high-speed avenues of approach and at choke points. A Hornet gauntlet typically consists of 40 to 50 Hornets employed in a series of clusters. Each cluster contains 3 to 6 Hornets. The Hornets in each cluster are emplaced at 50-meter intervals, perpendicular to the road centerline, on alternating sides of the road/avenue of approach, and 25 to 40 meters (depending on the terrain and vegetation) off the side of the road/avenue of approach. The distance between clusters varies from 750 to 2,000 meters so that the advancing threat force is kept guessing about when they will encounter the next cluster (Figure 1-6).

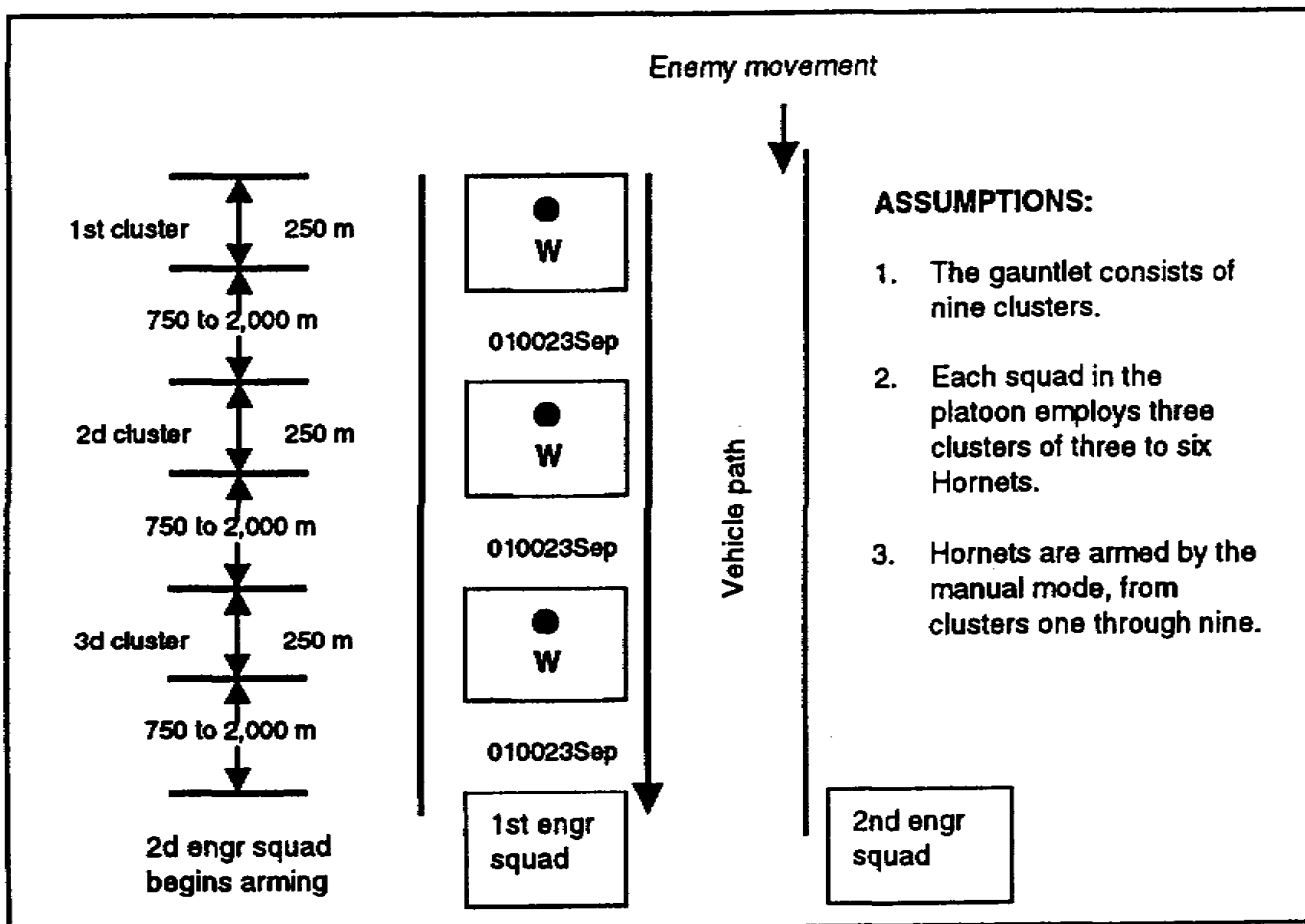


Figure 1-6. Hornet gauntlet obstacle (platoon)

(b) Before laying any Hornets, the munitions will be prearmed as stated in paragraph 1-6a(2)(b), page 1-8. Soldiers also set the target switch to *HVY* for clusters closest to the enemy so that the Hornets will only engage heavy tracked vehicles. Soldiers select manual arming by removing a protective tab, depressing the manual-mode select switch (a push button), verifying functionality via a flashing status light, and reinstalling the tab.

(c) Hornets are emplaced beginning on the friendly side of the cluster. The first engineer squad emplaces Hornet munitions beginning with the cluster closest to the enemy. The emplacement vehicle drives even with the first Hornet emplacement site. The emplacing soldier dismounts, and a soldier in the vehicle hands him a Hornet. The emplacing soldier then proceeds to the Hornet emplacement site.

(d) The vehicle travels to a point even with each subsequent emplacement site. A soldier deploys at each emplacing site to lay one of the remaining Hornet munitions in the cluster. The vehicle then turns around and stops even with the last Hornet (on the enemy side) in the cluster.

(e) Upon reaching the Hornet employment location, each emplacing soldier removes the cover and S&H band, rotates the SD switch to *U* (the arm control switch's unlock position), and on the command (audible or visual signal) of the noncommissioned officer in charge (NCOIC), pushes the arm switch to *ARM*. Once the Hornets' arming switches are thrown, soldiers return to the road, taking the covers and the S&H bands with them, and wait to be picked up by the emplacement vehicle. After all of the soldiers are in the emplacing vehicle, the driver quickly travels to the safe standoff distance (475 meters). The Hornet munitions in the first cluster will arm at the end of the safe-separation time (5 to 6 minutes). The squad repeats the emplacement process for the next Hornet cluster in the gauntlet, taking care not to emplace any Hornets or drive within 475 meters of the previous cluster. Each squad in the platoon typically emplaces three clusters in the Hornet gauntlet, or 9 to 18 total Hornets.

1-7. Recording and Marking. When the Hornet munition field is completed, the officer in charge (OIC) will identify an NCO to be the recorder. The NCO will collect data from the NCOICs of the emplacing squads and complete Department of the Army (DA) Form 1355 as outlined in Chapter 8 of FM 20-32. An example of the DA Form 1355 is shown in Figure 1-7. The OIC will ensure that the DA Form 1355 is completed on time and is accurate.

Marking the Hornet munition field will be completed as prescribed in Chapter 2 of FM 20-32. The fence will be no closer than 150 meters from the nearest Hornet munition. Marking must be completed before emplacing the munitions.

SECRET (when completed)

DA FORM 1355, MAR 87
EDITION OF JUL 87 IS OBSOLETE

MINEFIELD - RECORD		3		Copy No. 1 of 4	
AUTHORITY: 62ND INF DIV		4		MINEFIELD NUMBER: 1002-A2B-HHIX	
Laying Unit: 1ST PCT B CO 2ND ENGR BN		5		DATE: 090745Z JAN 96	
OFFICER IN CHARGE: 2LT GREG BIER		6		TIME: 091800Z JAN 96	
762-01-1552		7		RECORD: 5002 DOE5002-01-1552	
LANDMARKS		8		INTERMEDIATE MARKERS	
NO. COORDINATES		9		DESCRIPTION	
1 UT 34917312		1		(4) U-Shaped pickets 12" above ground	
2		2			
3 UT 34927323		3			
4		4			
DESCRIPTION OF BOUNDARY FENCE OR MARKING STANDING FENCE, ONE STAND CATTLE FENCE ON all 4 sides		5		METHOD OF CLOSING	
NO. OF MINES/ROWS ... 2		6		SEE NOTE 8 BLOCK 12	
U-Shaped Pickets 6" above ground		7			
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9		9			
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ENEMY **1**

MAGNETIC NORTH

SAMPLE

EXHAUST (when completed)

LEGEND

example: 20 indicates distance

scale: 1 cm = 100 m METRES.

UNLESS OTHERWISE STATED ALL ANGLES ARE MAGNETIC BEARINGS USING A 360° COMPASS. INDICATE ALTERNATIVE IF USED.

64 PTS	8400 MBS	400 GRADS	OTHER
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ALL DISTANCES RECORDED ARE IN METRES

INDICATE SYSTEM OF MEASUREMENT USED

PACING	CLOTH	STEEL	OTHER
10.75 M	1000 YDS	1000 YDS	

SIGNATURE *Aug 21*

17 SECOND (when completed)

Figure 1-7. Sample DA Form 1355 (front side) for a Hornet minefield/munition field (continued)

LESSON 1

PRACTICE EXERCISE

The following items will test your grasp of the material covered in this lesson. There is only one correct answer for each item. When you complete the exercise, check your answer with the answer key that follows. If you answer any item incorrectly, study again that part of the lesson which contains the portion involved.

1. What is the safe-separation time (in minutes) after manually arming the Hornet?
 - A. 3 to 4
 - B. 5 to 6
 - C. 10 to 15
 - D. 15 to 20
2. A Hornet gauntlet typically consists of how many Hornets?
 - A. 15 to 20
 - B. 30 to 36
 - C. 36 to 40
 - D. 40 to 50
3. Within how many meters is the Hornet capable of engaging vehicles?
 - A. 50
 - B. 100
 - C. 150
 - D. 200
4. How many selectable SD times does the Hornet have?
 - A. 2
 - B. 5
 - C. 7
 - D. 9
5. What is the effective life (in hours) of the active battery pack once it is inserted into the munition?
 - A. 2
 - B. 4
 - C. 6
 - D. 8

LESSON 1
PRACTICE EXERCISE
ANSWER KEY AND FEEDBACK

<u>Item</u>	<u>Correct Answer and Feedback</u>
1. B.	5 to 6 If manual arming is used ... (page 1-11, para 1-6c(2)(c))
2. D.	40 to 50 A Hornet gauntlet ... (page 1-13, para 1-6d(2)(X))
3. B.	100 It will automatically search ... (page 1-1, para 1-1)
4. B.	5 The SD time ... (page 1-4, para 1-4a or page 1-3, Table 1-1)
5. B.	4 The Hornet's active battery pack ... (page 1-4, par 1-4)

LESSON 2

EMPLOY SCATTERABLE MINES

OVERVIEW

LESSON DESCRIPTION:

In this lesson, you will learn the employment tactics, processes, and techniques of the Volcano, Flipper, and MOPMS. After completing this lesson, you will understand how each system is employed and how it marked and reported.

TERMINAL LEARNING OBJECTIVE:

- ACTION:** You will learn to employ scatterable mines.
- CONDITION:** You will be given information on the employment of scatterable mines and the material contained in this lesson.
- STANDARD:** You must demonstrate your knowledge on the employment of the Flipper, Volcano, and MOPMS.
- REFERENCE:** The material contained in this lesson was derived from FM 20-32.

INTRODUCTION

This lesson is presented in three parts. Part A provides basic information on the deployment tactics and techniques of the Volcano mine system. Part B provides a basis for understanding the employment of the Flipper mine dispensing system. Part C provides information on the employment of the MOPMS.

PART A - VOLCANO

2-1. General. The Volcano multiple-delivery mine system (Figure 2-1, page 2-2) can be dispensed from the air or on the ground. It can be mounted on a 5-ton vehicle, an M548 tracked cargo carrier, a HEMTT, a palletized load system (PLS) flat rack, or a UH-60A Blackhawk helicopter. The Volcano uses modified Gator mines and consists of four components (Figure 2-2, page 2-2)--the M87-series mine canister, the M139 dispenser, the dispenser control unit (DCU), and the vehicle-specific mounting hardware (aircraft also requires a jettison kit). The Volcano uses M87 and M87A1 mine canisters. The M87 mine canister is prepackaged with five AT mines, one antipersonnel (AP) mine, and a propulsion device inside a tube housing. The M87A1 mine canister is prepackaged with six AT mines and no AP mines. The mixture of mines is fixed and cannot be altered. Mines are

electrically connected with a web that functions as a lateral dispersion device as the mines exit the canister. Spring fingers mounted on each mine prevent it from coming to rest on its edge. All canisters are capable of dispensing mines with 4-hour, 48-hour, or 15-day SD times. The SD times are field-selectable before dispensing and do not require a change or modification to the base M87-series canister. The delay-arm times are 2 minutes 30 seconds for the AT mine and 4 minutes for the AP mine.

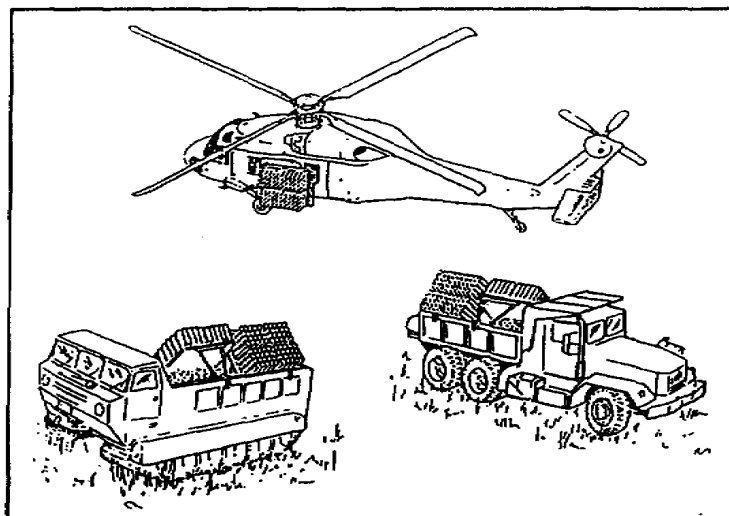


Figure 2-1. Volcano mine system

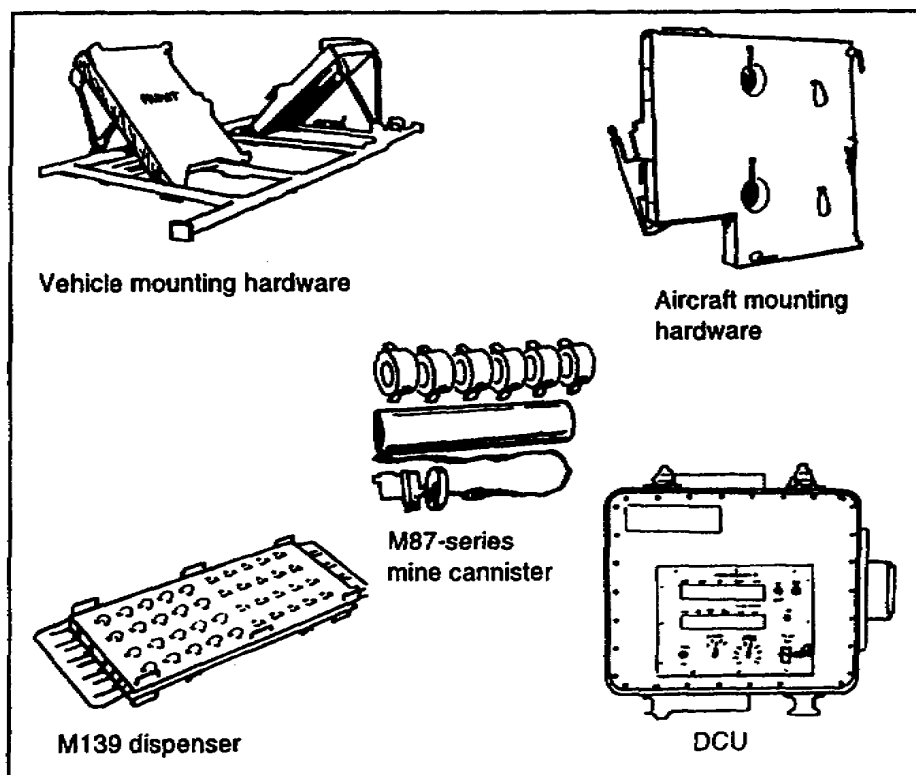


Figure 2-2. Volcano components

a. The dispenser consists of an electronic DCU and four launcher racks. Four racks can be mounted on a vehicle, and each rack can hold 40 M87-series mine canisters. The racks provide the structural strength and the mechanical support required for launch and provide the electrical interface between the mine canisters and the DCU. Mounting hardware secures the racks to the vehicle or the aircraft. Mounting hardware for the UH-60A Blackhawk includes a jettison subassembly to propel the Volcano racks and canisters away from the aircraft in the event of an emergency.

b. The operator uses the DCU to control the dispensing operation electrically from within the carrier vehicle. The DCU provides controls for the arming sequence and the delivery-speed selection and sets the mine SD times. The DCU allows the operator to start and stop mine dispensing at anytime. A counter on the DCU indicates the number of remaining canisters on each side of the carrier.

c. Mines are dispensed from their canisters by an explosive propelling charge. For ground vehicles, the mines are dispensed 25 to 60 meters from the vehicle at ground speeds of 8 to 90 kilometers per hour. The average time to emplace one ground Volcano load (160 canisters) is 10 minutes. For aircraft, the mines are dispensed 35 to 70 meters from the line of flight. The aircraft flies at a minimum altitude of 1.5 meters, at speeds of 20 to 120 knots. This system uses the host vehicle as a power source. (Attaching the system to the vehicle does not significantly degrade its mobility.) This system has three field-selectable SD times (4 hours, 48 hours, and 15 days) for the mines. Reload time (not including movement time to the reload site) for an experienced four-man crew is approximately 20 minutes. Except for the mounting hardware, there is total system commonality between the air and ground Volcano systems.

2-2. Employment. The primary mission of the Volcano is to provide United States (US) forces with the capability to rapidly emplace large minefields under varied conditions. The Volcano can be rapidly attached to air or ground vehicles. It is used to emplace tactical minefields; reinforce existing obstacles; close lanes, gaps, and defiles; protect flanks; and deny probable enemy air-defense sites. Volcano minefields are ideal for providing flank protection of advancing forces and for operating in concert with air and ground cavalry units on flank guard or screen missions.

a. The ground Volcano is designed to emplace large minefields in depth. It is normally employed by combat engineer units. These mounted dispensers are primarily used to emplace tactical minefields oriented on enemy forces in support of maneuver operations and friendly AT fires.

b. The system is vulnerable to direct and indirect fires, so it must be protected when close to the forward line of own troops (FLOT). It is ideal for use as an obstacle reserve, employed when the enemy reaches a decision point that indicates future movement. Obstacles can then be emplaced in depth on the avenues the enemy is using, leaving other avenues open for friendly movement.

2-3. Emplacement. The principles and procedures of Volcano emplacement are significantly different for air- and ground-delivery systems. This lesson outlines the use of the ground-delivery Volcano system to emplace disrupt, fix, turn, and block minefields.

The principles and procedures of the air Volcano delivery system are outlined in Appendix D of FM 20-32. Both air and ground systems are capable of emplacing nonstandard minefields. However, the emplacement norms below streamline identifying resource requirements and conducting emplacement drills.

a. Air and ground Volcano systems emplace a minefield with an average AT linear density of 0.72 mine per meter and an AP linear density of 0.14 mine per meter. These densities may vary slightly since some mines will fail the arming sequence and self-destruct 2 to 4 minutes after dispensing. Additionally, some mines may not orient correctly, will not deliver their full mine effect, and will not produce a K-Kill. The probability of failing the arming sequence and misorienting is relatively small and does not appreciably degrade the minefield's lethality. For tracked vehicles, the AT density yields more than 80 percent probability of encounter. Volcano AT mines do not have antihandling devices but are highly sensitive to any movement once they are armed. Any attempt to remove the mines will likely result in detonation.

b. The basic site layout is extremely important, and it is the same for air and ground Volcano minefields. The limits of air and ground Volcano minefields are marked before emplacement when the situation allows it. The minefield is not premarked when the situation (offensive operations or situational obstacles) does not allow it. If the mines have not self-destructed, the minefield is marked before the unit leaves the area or turns it over to an adjacent unit. The NCOIC of the minefield emplacement ensures that the following is completed:

(1) Minefield marking must include the safety zone, which is 40 meters from the start and end points and 80 meters to the left or right of the centerline.

(2) The start and end points of the strip centerline are marked based on minefield front and the number of strips. For a ground Volcano minefield, guide markers are emplaced along the path of the centerline but are offset left to allow the host vehicle to remain on the centerline.

(3) Minefield marking must leave a gap on each centerline for vehicle entrance and exit when using a ground-delivery system. The number of guide markers depends on the terrain and visibility. Guide markers are not required for an air Volcano minefield because the pilot will use the start and end points of the centerline as reference points.

c. Figure 2-3 illustrates the emplacement pattern for standard disrupt and fix minefields using the ground or air Volcano. Disrupt and fix minefields use only one centerline to give a minefield depth of 120 meters (ground) or 140 meters (air), not including the safety zone. The strip centerline is 277 meters (ground) or 278 meters (air) long. The minefield is emplaced as follows:

(1) The host vehicle moves toward the start point, achieving and maintaining the ground or air speed selected on the DCU.

(2) The operator depresses the launch switch on the DCU as the vehicle passes the start marker, and he stops dispensing mines when the vehicle passes the end marker.

(3) The operator dispenses 40 canisters (20 on each side) along the centerline.

(4) The vehicle moves out of the minefield (for ground emplacement), marks the exit, and waits a minimum of 4 minutes before approaching the minefield. This delay allows faulty mines to self-destruct.

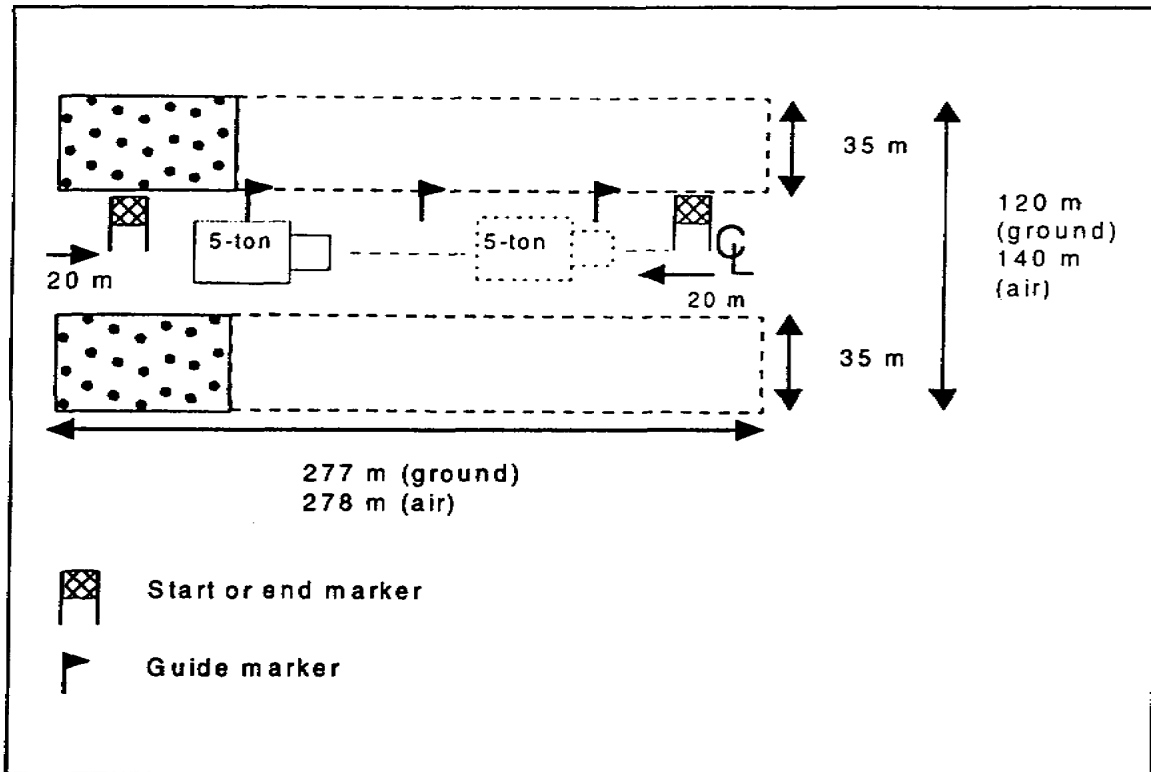


Figure 2-3. Volcano disrupt and fix minefields

d. Turn and block minefields (Figure 2-4, page 2-6) are emplaced using the same basic procedures as those used for disrupt and fix minefields. However, turn and block minefields use two strip centerlines along a front of 555 meters (ground) and 557 meters (air). During site layout, centerlines are separated by at least 320 meters for both ground and air delivery. This gives a total minefield depth of 440 meters (ground) or 460 meters (air). The minefield is emplaced as follows:

(1) The host vehicle moves toward the start point, achieving and maintaining the ground or air speed selected on the DCU.

(2) The operator depresses the launch switch on the DCU as the vehicle passes the start marker, and he stops dispensing mines when the vehicle passes the end marker.

(3) The operator dispenses 80 canisters along each centerline (40 on each side); therefore, turn and block minefields require a total Volcano load of 160 canisters. Wherever possible, two ground Volcanoes are employed simultaneously on turn and block minefields.

(4) The vehicle moves out of the minefield (ground emplacement), marks the exit, and waits a minimum of 4 minutes after dispensing the first strip before dispensing the second strip. This allows mines that fail the arming sequence to self-destruct.

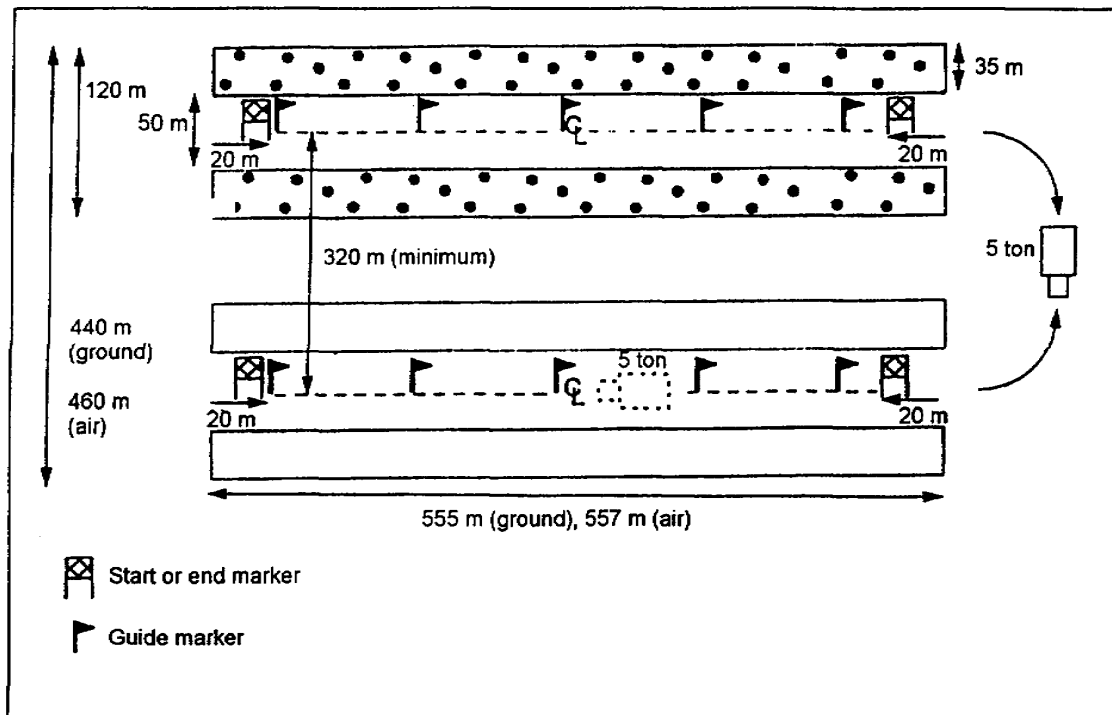


Figure 2-4. Volcano turn and block minefields

2-4. Recording. When the Volcano minefield is completed, the OIC identifies an NCO to be the recorder. The NCO collects data from the NCOICs of the emplacing squads and completes a scatterable minefield report as outlined in Chapter 8 of FM 20-32. Figure 2-5 shows the format for completing the scatterable minefield report. The OIC ensures that the report is completed on time and is accurate.

PART B - FLIPPER

2-5. General. The M38 Flipper is a manual mine dispenser that is designed to emplace M74 AP and M75 AT mines (Figure 2-6). It is a simple dispensing system and uses little automation to load and dispense mines. In short, mines are loaded by hand into a feeder chute. The operator determines the pattern by manually pivoting the dispenser across a 180-degree arc. Mines are dispensed in a 35-meter arc from the host vehicle. The Flipper provides the commander with great flexibility since it can be mounted on M113 armored personnel carriers, M548 cargo carriers, 2 1/2-ton cargo and dump trucks, and 5-ton cargo and dump trucks with no modification. The Flipper weighs approximately 58.5 kilograms, and it uses the electrical power system of the host vehicle. It can dispense six mines per minute, and deployment requires only two people-the mine loader and the vehicle operator.

Line Number	Information Required	Data
1	Approving authority	Enter the approving authority, such as CDR 3AD.
2	Target/obstacle number	If the minefield is part of an obstacle plan, enter the obstacle number, such as 2XXX0157. This number represents II Corps, target number 157. If the minefield is not a part of an obstacle plan or does not have a number, then leave this line blank or enter NA.
3	Type of emplacing system	Enter the type system that emplaced the minefield, such as Flipper, artillery, or Volcano.
4	Type of mines	Enter AP for antipersonnel mines and AT for antitank mines. If both types of mines are used, enter AP/AT.
5	Life cycle	Enter the date-time group (DTG) the minefield was emplaced and the DTG the last mine SDs.
6-14	Aim point/corner points of minefield	If the system used to emplace the minefield uses a single aim point to deliver the mines, enter that aim point, such as MB 10102935. If the system has distinct corner points (Volcano), enter those corner points, such as MB 17954790, MB 18604860, MB 18504890, and MB 18054895.
15	Size of safety zone from aim point	If an aim point is given in Line 6, enter the size of the safety zone from the aim point. Example: Artillery emplaces a minefield from aim point MB 10102935, and the safety zone is 1,000 x 1,000 m. Enter 500 m so that personnel plotting or receiving the information can plot the coordinates and go 500 m in each direction from the aim point to plot the safety zone.
16	Unit emplacing mines/report number	Enter the unit emplacing mines and the report number, such as B CO 23 ENGR BN 4. Reports should be numbered consecutively. This would be the fourth minefield that B Company (Co) has emplaced.
17	Person completing report	Enter the person's name completing the report, such as SFC Jones.
18	DTG of report	Enter the DTG of the report, such as 160735Z OCT 90.
19	Remarks	Include any other items the reporting unit may feel are important.

Figure 2-5. Scatterable minefield/munition field report and record work sheet

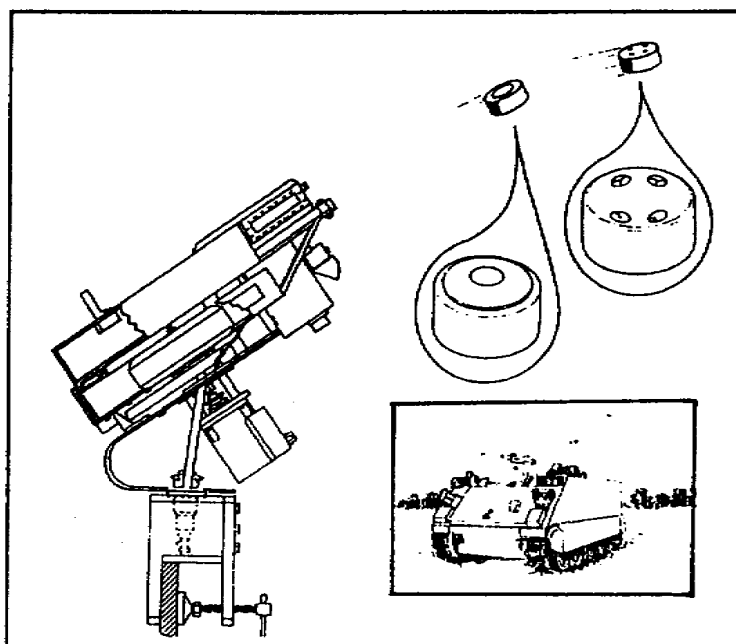


Figure 2-6. Flipper mine dispenser

2-6. Employment. The Flipper has two disadvantages--the emplacement method requires the crew to be exposed during operation, and it is difficult for soldiers to dispense mines on the move. However, when mounted on a tracked vehicle, the Flipper's mine-dispensing capability can keep up with maneuver forces during movement; and the Flipper can emplace a minefield quickly in response to a threat. An additional advantage is the system's versatility when emplacing mines. It can be used to emplace standard tactical minefields, small point minefields, or protective minefields relatively close to friendly positions. Flipper minefields can be used to reinforce existing obstacles and reseed gaps and lanes in minefields. Manually aiming the dispenser allows engineers to emplace scatterable mines with great accuracy on a point target or in restrictive terrain.

2-7. Emplacement. Use stop-and-dispense laying procedures to minimize risks to the Flipper operator. If it is necessary to dispense mines while the host vehicle is in motion (roll and dispense), speed restrictions on the host vehicle must be applied. The NCOIC ensures that personnel do not operate the Flipper dispenser when the prime vehicle speed exceeds 8 kilometers per hour on highways or 2.8 kilometers per hour off the road. Since it is very difficult to maintain a speed under 3 kilometers per hour, the stop-and-dispense laying procedure is recommended for all conditions.

a. The NCOIC ensures that all personnel are cautioned about operating the Flipper in a hazardous area. If a mining mission requires the dispensing of mines over hilly terrain, mining should be accomplished while traversing across the top of the hill or going uphill. Mining missions should not be accomplished when descending a hill, because the mines may roll to the base of the hill.

b. The operator can vary Flipper minefield density by adjusting the number of mines dispensed at each stopping point. Minefield composition is determined by the number of AT and AP mines the operator dispenses at a given stopping point.

c. When emplacing a standard minefield (disrupt, fix, turn, or block) with the Flipper, the crew uses a set stop-and-dispense procedure. During site layout, dispensing markers are placed every 35 meters along a centerline. These markers are offset from the centerline, half the width of the vehicle to the left (relative to the direction of emplacement). This allows the vehicle driver to guide on the markers during movement and allows the vehicle to remain on the centerline.

d. The minefield should be emplaced as follows:

(1) The host vehicle moves toward the start point and stops the vehicle when he reaches a dispensing marker.

(2) The driver then traverses the dispenser to the zero-degree position (at a right angle to the direction of emplacement, toward the enemy) as shown in Figure 2-7. This is the Number 1 mine position.

(3) The operator dispenses mines in the order shown, traversing the dispenser in a 180-degree arc from the enemy side to the friendly side. The target angles shown are a

guide that can be used to achieve the optimal spacing between mines and to achieve uniform linear density. All angles are relative to the Number 1 mine at zero degrees.

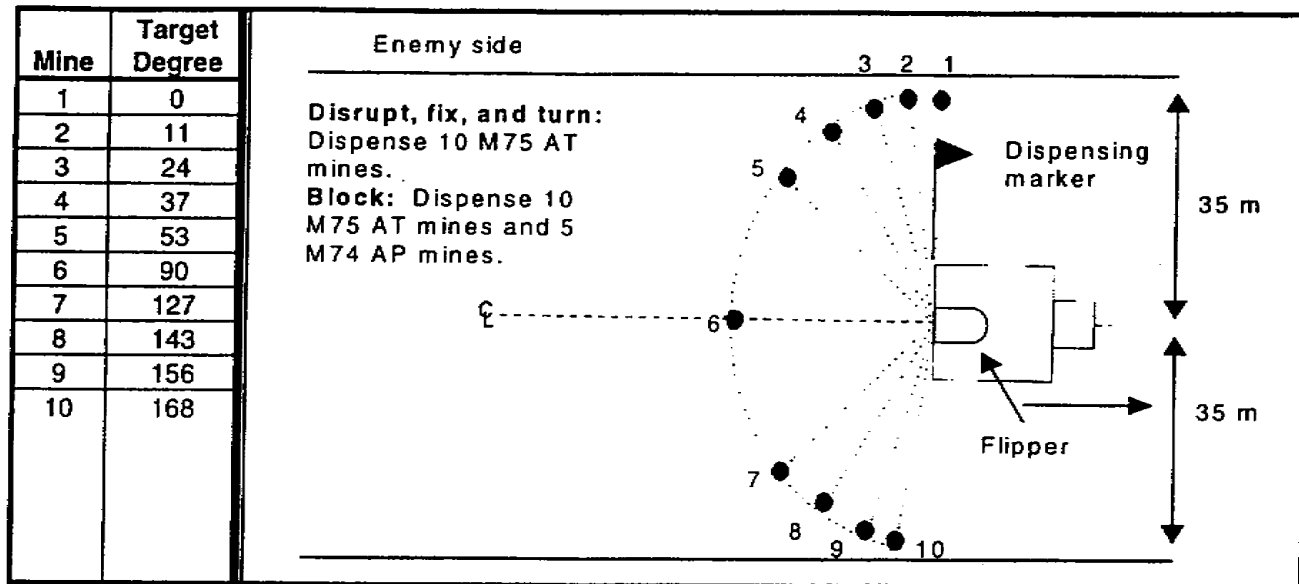


Figure 2-7. Flipper stop-and-dispense point

(4) Crews may want to fabricate an aiming circle and mount it to the Flipper to make dispensing more accurate. As a general guide, the operator should traverse between 15 and 20 degrees between each mine.

e. For all standard minefields, the operator dispenses 10 M75 AT mines (two sleeves) at each dispensing point. For block minefields, he dispenses 5 M74 AP mines (one sleeve) in addition to the AT mines.

f. Figure 2-8, page 2-10, shows the pattern for Flipper disrupt and fix minefields. These minefields have a frontage of 245 meters and a depth of 70 meters. Emplacing fix and disrupt minefields with the Flipper requires four dispensing points; the first one is 35 meters from the centerline start point. Disrupt and fix minefields require 70 M75 AT mines (14 sleeves).

g. Figure 2-9, page 2-10, shows the pattern for Flipper turn and block minefields. These minefields require two centerlines, 170 meters apart. The minefield front is 490 meters and requires 14 dispensing points on each centerline. The total minefield depth is 240 meters. Turn and block minefields require 280 M75 AT mines (56 sleeves). Block minefields require 140 M74 AP mines (28 sleeves) in addition to AT mines. Optimally, two Flipper dispensers are used to emplace turn and block minefields so that both strips, are emplaced simultaneously. However, one Flipper can emplace both strips, one at a time. Table 2-1, page 2-11, summarizes the site layout for Flipper minefields.

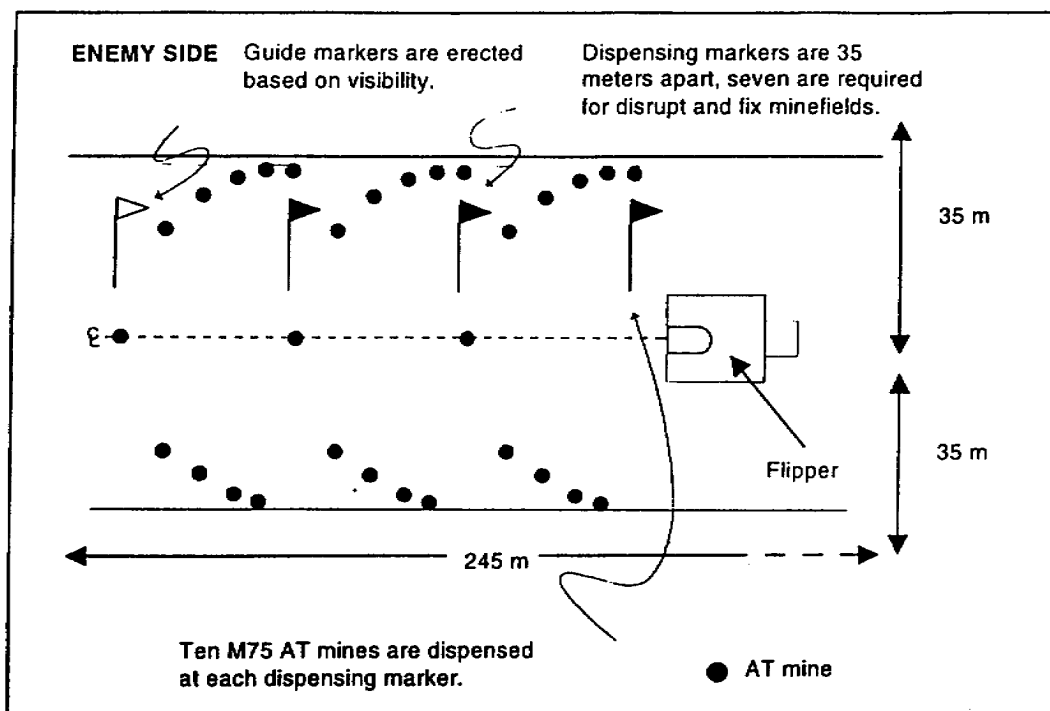


Figure 2-8. Flipper disrupt and fix minefields

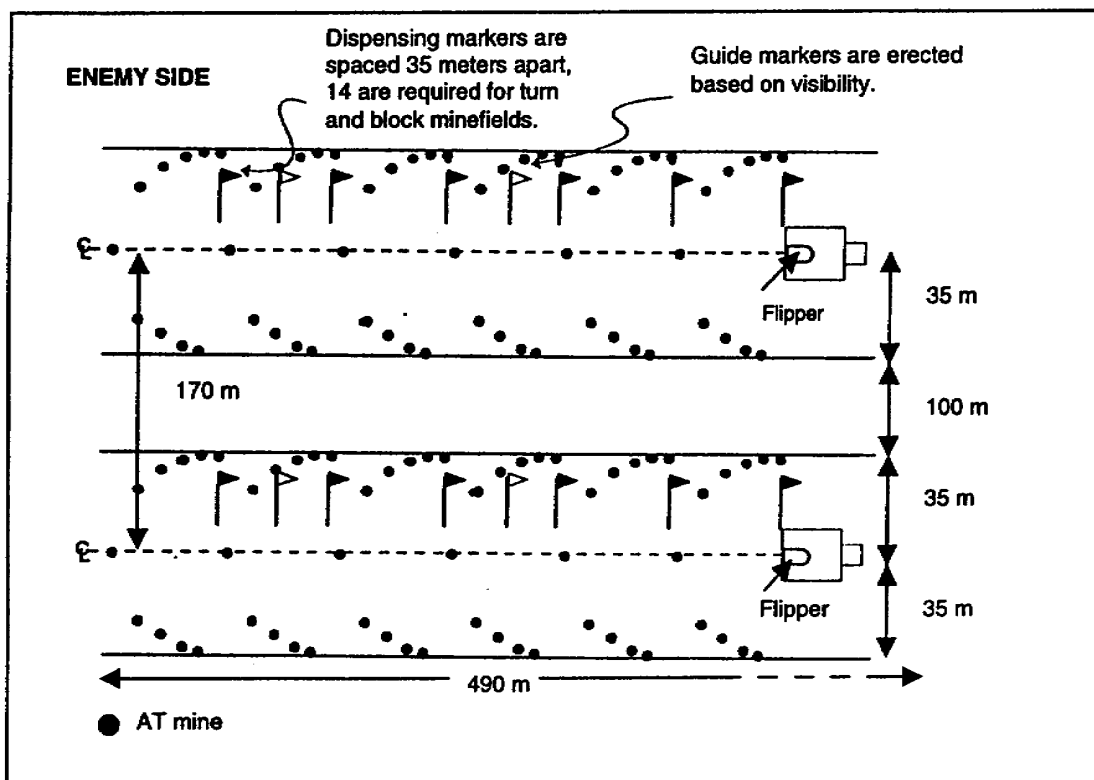


Figure 2-9. Flipper turn and block minefields

Table 2-1. Flipper minefield data

Type of Minefield	Depth (meters)	Front (meters)	Number of Strips	Dispensing Points Per Strip	M75s Per Dispensing Point	M74s Per Dispensing Point	Total M75 AT Mines	Total M74 AP Mines
Disrupt	70	245	1	7	10 (2 sleeves)	0	70 (14 sleeves)	0
Fix	70	245	1	7	10 (2 sleeves)	0	70 (14 sleeves)	0
Turn	240	490	2	14	10 (2 sleeves)	0	280 (56 sleeves)	0
Block	240	490	2	14	10 (2 sleeves)	5 (1 sleeve)	280 (56 sleeves)	140 (28 sleeves)

2-8. Recording. When the Flipper minefield is completed, the NCOIC completes a scatterable minefield report as outlined in Chapter 8 of FM 20-32. Figure 2-5, page 2-7, shows the format for completing the scatterable minefield report. The OIC ensures that the report is completed on time and is accurate.

PART C - MOPMS

2-9. General. The MOPMS (Figure 2-10) is a man-portable, 162-pound, suitcase-shaped mine dispenser that can be emplaced anytime before dispensing mines. The dispenser contains 21 mines (17 AT and 4 AP). The mines have finger-like leaf springs along their outer circumference that are designed to push the mine into proper orientation if they land on their side.

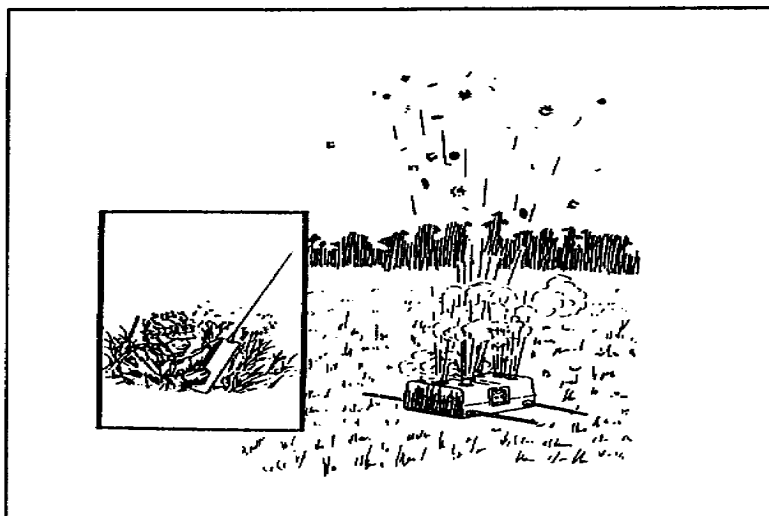


Figure 2-10. MOPMS

a. Each dispenser contains seven tubes; three mines are located in each tube. When dispensed, an explosive propelling charge at the bottom of each tube expels mines through the container roof. Mines are propelled 35 meters from the container in a 180-degree semicircle (Figure 2-11). The resulting density is 0.01 mine per square meter. The safety zone around one container is 55 meters to the front and sides and 20 meters to the rear.

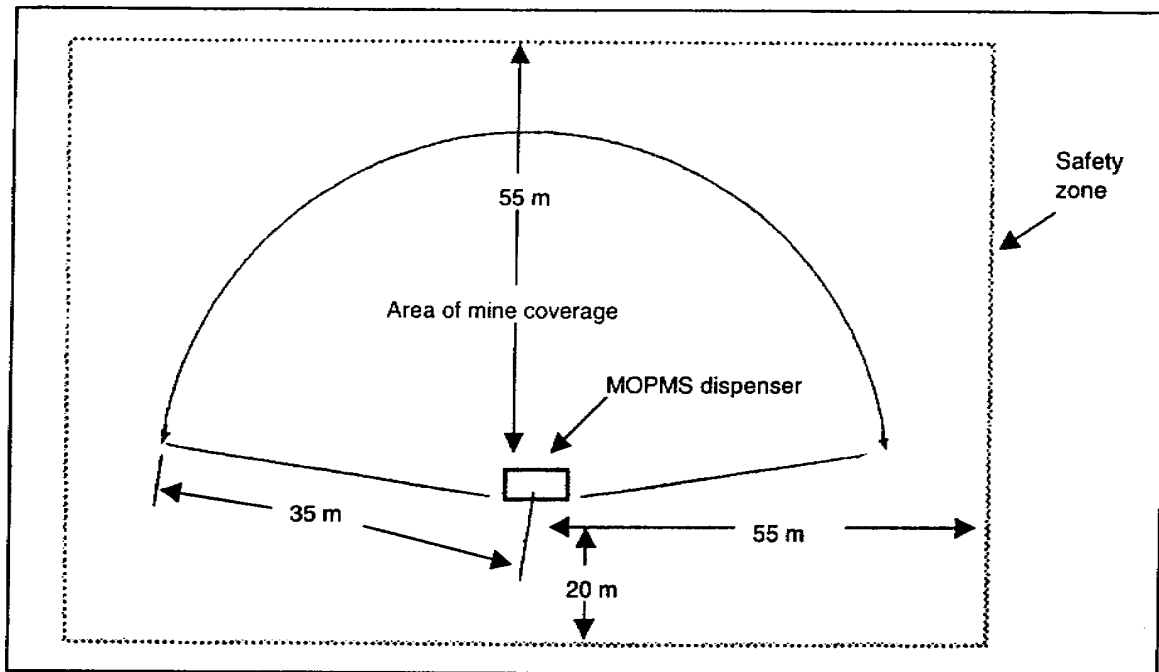


Figure 2-11. MOPMS emplacement and safety zone

b. Mines are dispensed on command using an M71 RCU or an electronic initiating device, such as the M34 hand-blasting machine connected to the container by field wire. Once mines are dispensed, they cannot be recovered or reused. If mines are not dispensed, the container may be disarmed and recovered for later use.

c. The RCU can recycle the 4-hour SD time of the mines three times, for a total duration of approximately 13 hours. Mines with a 4-hour SD time will begin to self-destruct at 3 hours and 12 minutes. All active mines must be recycled within 3 hours of the initial launch or last recycle. This feature makes it possible to keep the minefield emplaced for longer periods if necessary. The RCU can also self-destruct mines on command, allowing a unit to counterattack or withdraw through the minefield, as necessary, rather than waiting until the SD time has expired. The RCU can control up to 15 MOPMS containers or groups of containers from a distance of 300 to 1,000 meters via separate pulse-coded frequencies. Coded frequencies defeat threat electronic countermeasures directed against the system.

d. If the M71 RCU is not available, a direct wire link is used in conjunction with the M32, M34, or M57 blasting machine. By using the M32 10-cap blasting machine, one MOPMS dispenser can be detonated at a maximum range of 1,000 meters. The M34 50-cap blasting machine can detonate one MOPMS at a maximum range of 3,000 meters. (Due

to internal resistance, the maximum range is decreased by 400 meters for each additional MOPMS connected in series.) The M57 claymore-type firing device can fire only one MOPMS at a maximum range of 100 meters. When controlled by direct wire, MOPMS dispensers cannot be command-detonated, and the SD time cannot be recycled.

WARNING

The MOPMS dispenser has seven launch tubes. If all seven tubes are not visible after deployment or upon later inspection, mines are jammed in the tube(s). In this event, clear the area and notify the explosive ordnance detachment. The dispenser is considered to be unexploded ordnance. Do not attempt to recover the dispenser.

2-10. Employment. The MOPMS provides a self-contained, on-call minefield emplacement capability for all forces. It can be command-detonated, reused (if mines are not dispensed), and directly emplaced to provide complete and certain coverage of small or critical targets. The ability to command-detonate mines or extend their SD time provides an added flexibility not currently available with other scatterable mine systems. With its unique characteristics, the MOPMS is ideally suited for the following minefield missions:

- Closing gaps and lanes in existing minefields.
- Emplacing hasty protective minefields.
- Emplacing deliberate protective minefields (cases emplaced, but mines not dispensed).
- Emplacing nuisance minefields (trails, crossing sites, landing zones, drop zones, and road junctions).
- Closing counterattack routes temporarily.
- Supporting ambushes.
- Emplacing tactical disrupt and fix minefields.
- Supporting military operations on urbanized terrain (MOUT).

a. When the MOPMS is used to close lanes, the container is positioned and dispensed by personnel in an overwatching position from a safe standoff. The MOPMS is ideally suited for creating a small disrupt obstacle in support of engineers executing a reserved demolition. Engineers prepare the reserved target for demolition and emplace several MOPMS units on the enemy side, just out of target range. When the last forward elements passes through the target, the firing party detonates the charges. If something goes wrong or the firing party needs more time, MOPMS mines can be dispensed to disrupt the enemy before it reaches the target.

b. The MOPMS provides light and special forces with a versatile, compact system for emplacing nuisance minefields. It can be used in low-, mid-, and high-intensity conflicts and in a variety of environments. Transporting the MOPMS system using a vehicle, helicopter, or fixed-wing aircraft is its major limitation.

2-11. Emplacement. MOPMS dispensers are issued as standard Class V munitions and are drawn from an ammunition supply point on a mission-by-mission basis. RCUs are organizational issues of equipment and are assigned to engineer and combat arms units. Due to the weight of the system, it will normally be transported by vehicle, as close as possible to the emplacement site, where it can easily be hand-emplaced by four soldiers using the four foldout carrying handles.

a. To ensure that the minefield will be dispensed in the proper location, the container should be carefully sited by the NCOIC. Several containers can be used together to provide a greater area of coverage or higher mine density. If mines are not dispensed immediately, containers should be camouflaged and, if possible, buried. When placed in sand or snow, brace containers to prevent them from moving during mine dispensing. Designate a firing point that gives the operator clear observation of the area to be mined. Firing systems must be inspected according to MOPMS operating instructions. If mines are dispensed immediately, remove empty containers to avoid revealing the minefield location.

b. The MOPMS can be employed to emplace disrupt and fix tactical minefields. Emplacement procedures are the same as for protective minefields. However, MOPMS containers are arranged in a specific pattern to achieve the necessary depth, frontage, and density. Once a disrupt minefield is marked (to include the safety zone), MOPMS containers are arranged as shown in Figure 2-12. The safety zone is 55 meters to the front and sides and 20 meters from the rear of the container. The disrupt minefield uses four MOPMS containers that are spaced 70 meters apart to give a minefield front of 280 meters (not including the 235-meter safety zone). Other MOPMS containers are offset from the baseline by 35 meters to give the minefield a depth of 70 meters (not including the 235-meter safety zone). All containers are fired using the same RCU or firing device.

c. Figure 2-13 illustrates the arrangement of MOPMS containers for a fix minefield. The basic layout is the same as the disrupt minefield; however, the fix minefield has one additional MOPMS that is placed 70 meters forward of the baseline to act as an irregular outer edge (OE). This gives the same 280-meter front but increases the minefield depth to 115 meters (not including the safety zone).

2-12. Dispenser Operations. Move the dispenser to the proposed minefield site before entering the command and control data into the dispenser. Put the dispenser on the ground with the arrow on top pointed toward the proposed minefield site. This arrow points toward the center of the future minefield. Put the dispenser on sand or snow, bracing it so that it does not move. The NCOIC directs the soldiers to perform the following steps to employ the MOPMS dispenser.

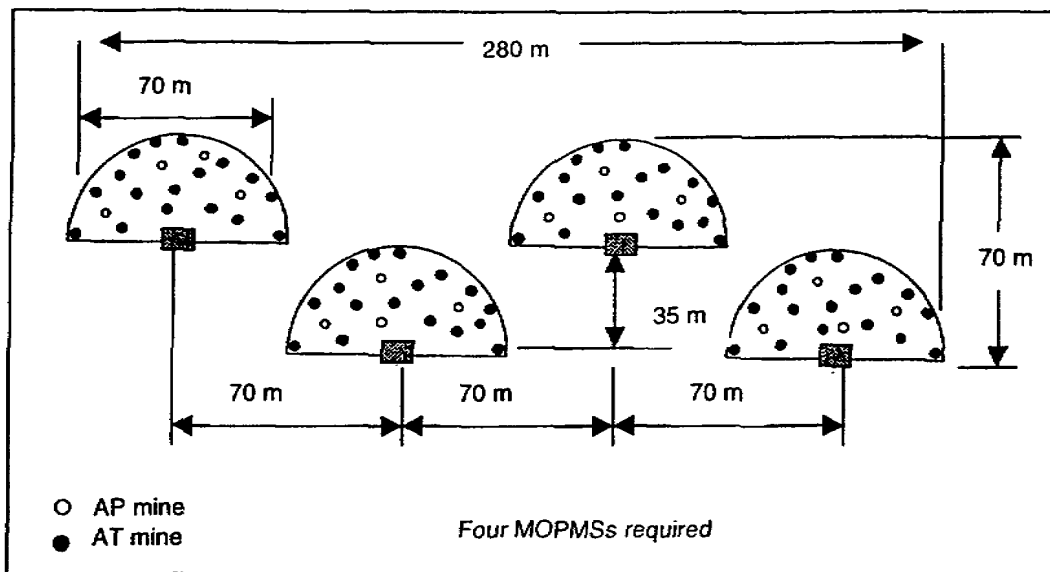


Figure 2-12. MOPMS in a disrupt minefield

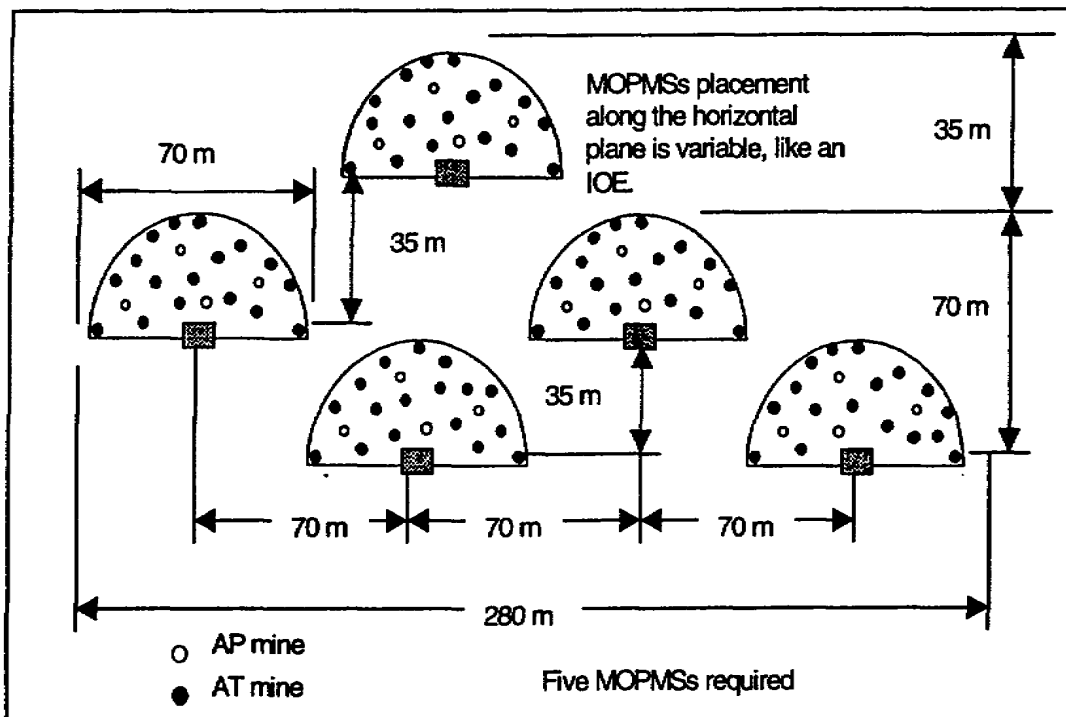


Figure 2-13. MOPMS in a fix minefield

a. Enter the command and control data into the dispenser and arm the dispenser (Figure 2-14, page 2-16).

(1) Turn the RCU on and enter the 4-digit send code. Press the GRP ID key (9) to select the correct group number.



Do not set the SAFE/ARM switch of the module control unit to the ARM position.

(2) Set the dispenser SAFE/ARM switch (6) to TEST. Check to ensure that the BATT OK (7) and the CKT OK (8) lights come on.

(3) Set the dispenser SAFE/ARM switch (6) to LOAD.

(4) Clear all foreign material off the top of the dispenser.

(5) Put the RCU on top of the dispenser. Carefully line up and join the MCDs of the RCU and the module control unit (4).

(6) Press the TRANSFER key (1) of the RCU. Check to ensure that the SENDING (2) and 1 TRANSFER (3) lights are displayed.

(7) Check to ensure that the DATA IN light (5) is on. This shows that the dispenser has the data.

(8) Turn off the RCU and remove it from the dispenser.

(9) Set the dispenser SAFE/ARM switch (6) to ARM by pushing the switch in and rotating it 1/4 turn clockwise. There is a 5-minute safe time before you can deploy the mines.

b. Deploy mines using the RCU (Figures 2-14 and 2-15).

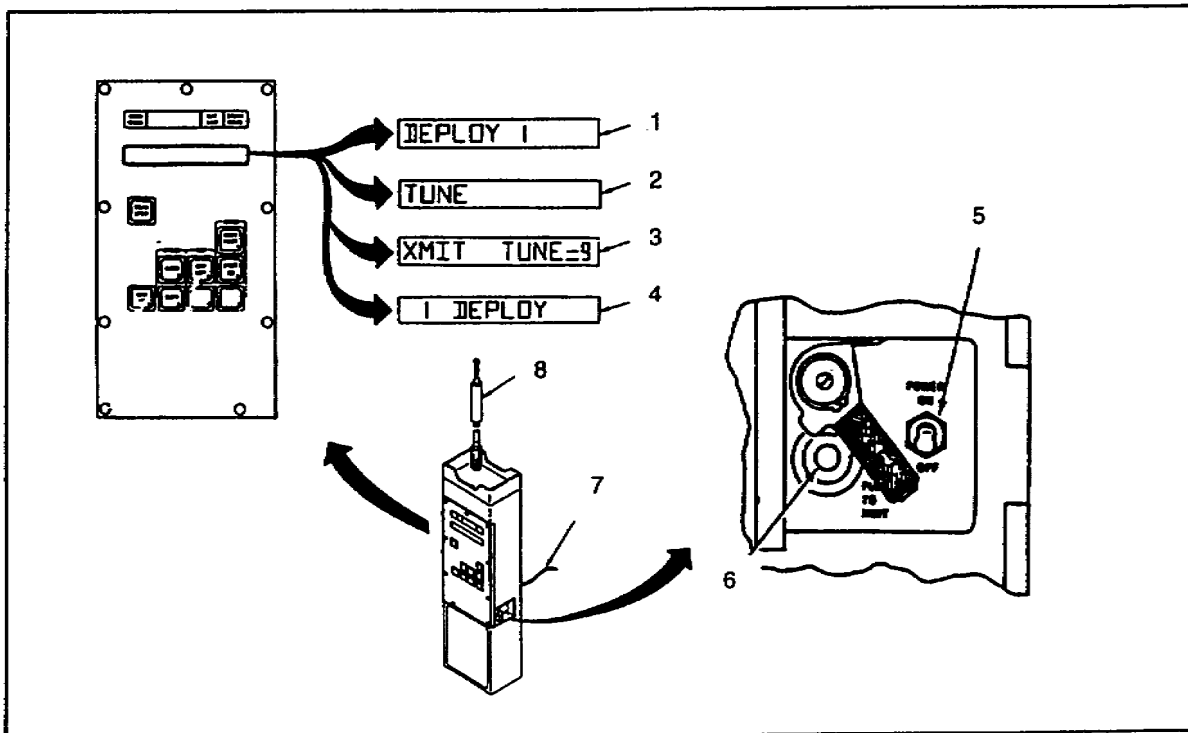


Figure 2-15. Remote control unit

(1) Attach the antenna (8) and the counterpoise cable (7) to the RCU (Figure 2-15, page 2-17).

(2) Extend the counterpoise cable on the ground toward the dispenser (Figure 2-15).

(3) Turn the RCU on (5) and enter the 4-digit send code (Figure 2-15).

(4) Press the GRP ID key (9)(Figure 2-14, page 2-16) until you see the number of the group you want to deploy (1)(Figure 2-15).

(5) Press the DEPLOY key (10)(Figure 2-14). Check to see that DEPLOY 1 is displayed (1)(Figure 2-15).

(6) Press and release the PUSH TO XMIT switch (6)(Figure 2-15). Ensure that TUNE (2) is displayed for about 1.5 seconds, and then check to see that XMIT TUNE = n (3) is displayed (Figure 2-15).

NOTE: The value of n is a measure of good or poor tuning. If n is equal to or greater than 5, you have a good tune. If the BAT LOW U light flashes during transmission, replace the battery immediately.

(7) Verify that 1 DEPLOY (4) is displayed after about 10 seconds (Figure 2-15).

(8) Turn the RCU off.

WARNING

If the mines fail to deploy after a deploy command, you may have a misfire. If this happens, check all of the connections at the firing position and try again. If the mines still do not deploy, wait 30 minutes and approach the dispenser from the module control unit side. Carefully set the SAFE/ARM switch to SAFE. Report the dispenser to ordnance personnel. Do not move a misfired dispenser.

2-13. Recording. When the Flipper minefield is completed, the NCOIC will complete a scatterable minefield report as outlined in Chapter 8 of FM 20-32. Figure 2-5, page 2-7, shows the format for completing the scatterable minefield report. The OIC ensures that the report is completed on time and is accurate.

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LESSON 2

PRACTICE EXERCISE

The following items will test your grasp of the material covered in this lesson. There is only one correct answer for each item. When you complete the exercise, check your answer with the answer key that follows. If you answer any item incorrectly, study again that part of the lesson which contains the portion involved.

1. What laying procedure is used to minimize the risks to the Flipper operator?
 - A. Roll and dispense
 - B. Stop and roll
 - C. Stop and dispense
 - D. Fire and roll
2. How many M75 AT mines does a disrupt Flipper minefield require?
 - A. 35
 - B. 70
 - C. 170
 - D. 280
3. When emplacing a turn effect Volcano minefield, how many minutes must the vehicle operator wait before starting the second strip?
 - A. 4
 - B. 8
 - C. 10
 - D. 30
4. Volcano minefield marking must include the safety zone, which is __ meters from the start and end points and __ meters to the left or right of the centerline.
 - A. 50, 100
 - B. 40, 80
 - C. 30, 70
 - D. 20, 60
5. The MOPMS RCU can recycle the 4-hour SD time of the mines __ times, for a total duration of approximately __ hours.
 - A. 4, 16
 - B. 3, 12
 - C. 4, 15
 - D. 3, 13

6. The safety zone is ___ meters to the front and sides of the MOPMS container and ___ meters behind the container.
- A. 55, 20
 - B. 65, 30
 - C. 45, 15
 - D. 60, 20

LESSON 2

PRACTICE EXERCISE

ANSWER KEY AND FEEDBACK

<u>Item</u>	<u>Correct Answer and Feedback</u>
1. C.	Stop and dispense Use stop-and-dispense...(page 2-8, para 2-7)
2. B.	70 Disrupt and fix minefields...(page 2-9, para 2-7f)
3. A.	4 The vehicle moves out...(page 2-6, para 2-3d(4))
4. B.	40, 80 Minefield marking must include...(page 2-4, para 2-3b(1))
5. D.	3, 13 The RCU can recycle...(page 2-12, para 2-9c)
6. A.	55, 20 The safety zone around...(page 2-12, para 2-9a)